
Space Weather Forecast

Issued on Wednesday, 18 October 2023 at 13:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Weak Coronal Mass Ejection arrivals possible, with a slight chance of isolated G1/Minor Geomagnetic Storm intervals throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with isolated weak common class flares. Peak flare was from an eruption beyond the western limb. There are currently five relatively small and simple sunspot regions on the disc, which have remained largely stable. A coronal mass ejection (CME) that left the Sun around 18/0300 UTC has been analysed to be far-sided. There is the potential for an Earth-directed component from a small CME associated with a dimming event on the southeast of the disc around 18/0600 UTC, this is low confidence. Enlil modelling of these recent ejections are not yet available. No other Earth-directed CMEs occurred in this period.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of background slow winds. around 280-300km/s. Wind speeds increased around 18/0200 UTC to 320-340km/s and have subsequently risen to around 360 km/s. The increase in wind strength may be a result of connection to an awaited stream of coronal hole fast winds. Interplanetary magnetic field (IMF), was predominantly weak. The important north-south component was also weak and variable, fluctuating more appreciably since 18/0200 UTC. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background, with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Very Low activity expected at first. There is a slight, but perhaps increasing chance of isolated M-flares through the period, as any development occurs on the disc and with the possibility of a returning region on Day 4 (21 Oct).

Solar Wind / Geomagnetic Activity: There are four coronal mass ejections (CMEs) with potential Earth-directed components, and two that are yet to be modelled by Enlil. Two from eruptions on 14 Oct may combine to give a glancing blow on Day 1 (18 Oct). Further glancing impacts are also possible late Day 2 or early Day 3 (19-20 Oct) from the CME originating with the common-class flare on 16 Oct, and late Day 3 or Day 4 (20-21 Oct) from a further eruption on 17 Oct. All are low confidence.

Slow wind conditions are expected Days 1-2 with a likely transition into the fast wind from a small coronal hole on Day 3. Some enhancement to slightly elevated levels possible from HSS or CME enhancements. Overall, mainly Quiet (Kp 0-2) geomagnetic activity is expected but with the potential for Unsettled (Kp 3) to Active (Kp 4) intervals. There is a very slight chance of G1/Minor Geomagnetic Storms (Kp 5) from any enhancements, this risk greatest either late Day 2 or Day 3 if the third CME arrival combines with fast winds. No appreciable enhancement to the auroral oval is expected.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background, with no solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	10	10	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	10	20	30	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)